

We claim:

1. Isolated nucleic acid molecule which encodes a cancer associated antigen, whose amino acid sequence is identical to the amino sequence encoded by nucleotides 287 to 3714 of SEQ ID NO: 1.
2. The isolated nucleic acid molecule of claim 1, consisting of nucleotides 287-3714 of SEQ ID NO: 1.
3. The isolated nucleic acid molecule of claim 1, consisting of anywhere from nucleotide 1 through nucleotide 4265 of SEQ ID NO: 1, with the proviso that said isolated nucleic acid molecule contains at least nucleotides 287-3714 of SEQ ID NO: 1.
4. Expression vector comprising the isolated nucleic acid molecule of claim 1, operably linked to a promoter.
5. Expression vector comprising the isolated nucleic acid molecule of claim 3, operably linked to a promoter.
6. Eukaryotic cell line or prokaryotic cell strain, transformed or transfected with the expression vector of claim 4.
7. Eukaryotic cell line or prokaryotic cell strain, transformed or transfected with the expression vector of claim 5.
8. Isolated cancer associated antigen comprising all or part of the amino acid sequence encoded by nucleotides 287-3714 of SEQ ID NO: 1.
9. Eukaryotic cell line or prokaryote cell strain, transformed or transfected with the isolated nucleic acid molecule of claim 1.
10. The eukaryotic cell line of claim 9, wherein said cell line is also transfected with a nucleic acid molecule coding for a cytokine.

11. The eukaryotic cell line of claim 10, wherein said cell line is further transfected by a nucleic acid molecule coding for an HLA molecule.
12. The eukaryotic cell line of claim 10, wherein said cytokine is an interleukin.
13. The biologically pure culture of claim 12, wherein said interleukin is IL-2, IL-4 or IL-12.
14. The eukaryotic cell line of claim 9, wherein said cell line has been rendered non-proliferative.
15. The eukaryotic cell line of claim 9, wherein said cell line is a fibroblast cell line.
16. Expression vector comprising a mutated or attenuated virus and the isolated nucleic acid molecule of claim 1.
17. The expression vector of claim 16, wherein said virus is adenovirus or vaccinia virus.
18. The expression vector of claim 17, wherein said virus is vaccinia virus.
19. The expression vector of claim 17, wherein said virus is adenovirus.
20. Expression system useful in transfecting a cell, comprising (i) a first vector containing a nucleic acid molecule which codes for the isolated cancer associated antigen of claim 8 and (ii) a second vector selected from the group consisting of (a) a vector containing a nucleic acid molecule which codes for an MHC or HLA molecule which presents an antigen derived from said cancer associated antigen and (b) a vector containing a nucleic acid molecule which codes for an interleukin.
21. Isolated cancer associated antigen comprising the amino acid sequence encoded by nucleotides 287-3714 of SEQ ID NO: 1.

22. Immunogenic composition comprising the isolated antigen of claim 21, and a pharmaceutically acceptable adjuvant.

23. The immunogenic composition of claim 22, wherein said adjuvant is a cytokine, a saponin, or GM-CSF.

24. Immunogenic composition comprising at least one peptide consisting of an amino acid sequence of from 8 to 12 amino acids concatenated to each other in the isolated cancer associated antigen of claim 21, and a pharmaceutically acceptable adjuvant.

25. The immunogenic composition of claim 24, wherein said adjuvant is a saponin, a cytokine, or GM-CSF.

26. The immunogenic composition of claim 24, wherein said composition comprises a plurality of peptides which complex with a specific MHC molecule.

27. Isolated peptide derived from the amino acid sequence encoded by SEQ ID NO: 1, wherein said isolated peptide binds to an HLA molecule, is a nonamer, decamer or undecamer, and comprises the amino acid sequence of SEQ ID NO: 3, from one to three additional N-terminal amino acid, and up to four additional C terminal amino acids.

28. Immunogenic composition which comprises at least one expression vector which encodes for a peptide derived from the amino acid sequence encoded by SEQ ID NO: 1, and an adjuvant or carrier.

29. The immunogenic composition of claim 28, wherein said at least one expression vector codes for a plurality of peptides.

30. Vaccine useful in treating a subject afflicted with a cancerous condition comprising the isolated cell line of claim 11 and a pharmacologically acceptable adjuvant.

31. The vaccine of claim 30, wherein said cell line has been rendered non-proliferative.
32. The vaccine of claim 31, wherein said cell line is a human cell line.
33. A composition of matter useful in treating a cancerous condition comprising a non proliferative cell line having expressed on its surface a peptide derived from the amino acid sequence encoded by SEQ ID NO: 1.
34. The composition of matter of claim 33, wherein said cell line is a human cell line.
35. A composition of matter useful in treating a cancerous condition, comprising (i) a peptide derived from the amino acid sequence encoded by SEQ ID NO: 1, (ii) an MHC or HLA molecule, and (iii) a pharmaceutically acceptable carrier.
36. Isolated antibody which is specific for the antigen of claim 21.
37. The isolated antibody of claim 36, wherein said antibody is a monoclonal antibody.
38. Method for screening for cancer in a sample, comprising contacting said sample with a nucleic acid molecule which hybridizes to all or part of SEQ ID NO: 1, and determining hybridization as an indication of cancer cells in said sample.
39. A method for screening for cancer in a sample, comprising contacting said sample with the isolated antibody of claim 36, and determining binding of said antibody to a target as an indicator of cancer.
40. Method for diagnosing a cancerous condition in a subject, comprising contacting an immune reactive cell containing sample of said subject to a cell line transfected with the isolated nucleic acid molecule of claim 1, and determining interaction of said transfected cell line with said immunoreactive cell, said interaction being indicative of said cancer condition.

41. A method for determining regression, progression of onset of a cancerous condition comprising monitoring a sample from a patient with said cancerous condition for a parameter selected from the group consisting of (i) CT7 protein, (ii) a peptide derived from CT7 protein (iii) cytolytic T cells specific for said peptide and an MHC molecule with which it non-covalently complexes, and (iv) antibodies specific for said CT7 protein, wherein amount of said parameter is indicative of progression or regression or onset of said cancerous condition.
42. Method of claim 41, wherein said sample is a body fluid or exudate.
43. Method of claim 41, wherein said sample is a tissue.
44. Method of claim 41, comprising contacting said sample with an antibody which specifically binds with said protein or peptide.
45. Method of claim 44, wherein said antibody is labelled with a radioactive label or an enzyme.
46. Method of claim 44, wherein said antibody is a monoclonal antibody.
47. Method of claim 41, comprising amplifying RNA which codes for said protein.
48. Method of claim 47, wherein said amplifying comprises carrying out polymerase chain reaction.
49. Method of claim 41, comprising contacting said sample with a nucleic acid molecule which specifically hybridizes to a nucleic acid molecule which codes for or expresses said protein.
50. Method of claim 41, comprising assaying said sample for shed protein.
51. Method of claim 41, comprising assaying said sample for antibodies specific for said CT7 protein, by contacting said sample with CT7 protein.

52. Method for diagnosing a cancerous condition comprising assaying a sample taken from a subject for an immunoreactive cell specific for a peptide derived from CT7, complexed to an MHC molecule, presence of said immunoreactive cell being indicative of said cancerous condition.

53. An isolated nucleic acid molecule which encodes a protein and which has a complementary sequence which hybridizes, under stringent conditions, to at least one of the nucleotide sequences set forth at SEQ ID NO: 5, 6, 7 or 8.

54. The isolated nucleic acid molecule of claim 53, wherein said protein is the protein encoded by the nucleotide sequence of SEQ ID NO: 5, 6, 7 or 8.

55. The isolated nucleic acid molecule of claim 53, selected from the group consisting of nucleic acid molecule comprising the nucleotide sequence of SEQ ID NO: 5, 6, 7 or 8.

56. Expression vector comprising the isolated nucleic acid molecule of claim 54, operably linked to a promoter.

57. Expression vector comprising the isolated nucleic acid molecule of claim 55, operably linked to a promoter.

58. Recombinant cell comprising the expression vector of claim 56.

59. Recombinant cell comprising the expression vector of claim 57.

60. Recombinant cell comprising the isolated nucleic acid molecule of claim 54.

61. Recombinant cell comprising the isolated nucleic acid molecule of claim 55.

62. Recombinant cell of claim 58, further comprising an expression vector which contains a nucleic acid molecule encoding a cytokine, operably linked to a promoter.

63. Recombinant cell of claim 59, further comprising an expression vector which contains a nucleic acid molecule encoding a cytokine, operably linked to a promoter.

64. Recombinant cell of claim 60, further comprising a nucleic acid molecule which encodes a cytokine.

65. Recombinant cell of claim 61, further comprising a nucleic acid molecule which encodes a cytokine.

66. The recombinant cell of claim 62, 63, 64, or 65, wherein said cytokine is interleukin.

67. The recombinant cell of claim 66, wherein said interleukin is 1L-2, 1L-4, or 1L-12.

68. The recombinant cell of claim 58, 59, 60, or 61, wherein said recombinant cell is a eukaryotic cell.

69. The recombinant cell of claim 68, which has been rendered non-proliferative.

70. The recombinant cell of claim 68, wherein said cell is a fibroblast.

71. Expression vector comprising a mutated or attenuated virus and the isolated nucleic acid molecule of claim 53, 54 or 55.

72. The expression vector of claim 71, wherein said virus is adenovirus, adeno associated virus, or vaccinia virus.

73. Expression system useful in making a recombinant cell, comprising:

(i) a first vector which encodes the protein encoded by the isolated nucleic acid molecule of claim 53, 54 or 55, and

(ii) a second vector which either (a) encodes an MHC or HLA molecule or (b) encodes an interleukin.

74. An isolated cancer associated antigen comprising the amino acid sequence encoded by SEQ ID NO: 5, 6, 7 or 8.

75. Composition comprising the isolated cancer associated antigen of claim 74, and a pharmaceutically acceptable adjuvant.
76. The composition of claim 75, wherein said adjuvant is a cytokine, a saponin, or GM-CSF.
77. Composition comprising at least one peptide consisting of an amino acid sequence of from 8 to 25 amino acids concatenated to each other in the isolated cancer associated antigen of claim 74, and a pharmaceutically acceptable adjuvant.
78. The composition of claim 77, wherein said adjuvant is a saponin, a cytokine, or GM-CSF.
79. The composition of claim 77, comprising a plurality of MHC binding peptides.
80. Composition comprising an expression vector which encodes at least one peptide consisting of an amino acid sequence of from 8 to 25 amino acids concatenated to each other in the isolated cancer associated antigen of claim 74, and pharmaceutically acceptable adjuvant.
81. The composition of claim 80, wherein said expression vector encodes a plurality of peptides.
82. Composition useful in treating a subject afflicted with a cancer, comprising the recombinant cell of claim 69 and a pharmacologically acceptable adjuvant.
83. The composition of claim 82, wherein said recombinant cell expresses an HLA or MHC molecule.
84. The composition of claim 82, wherein said recombinant cell is a human cell.
85. The composition of claim 77, further comprising at least one MHC or HLA molecule.

86. Isolated antibody which specifically binds to the isolated cancer associated antigen of claim 74.

87. The isolated antibody of claim 86, wherein said antibody is a monoclonal antibody.

88. A method for screening for possible presence of a pathological condition, comprising assaying a sample from a patient believed to have a pathological condition for antibodies specific to at least one of the cancer associated antigens encoded by SEQ ID NOS: 4, 5, 6, 7 or 8, presence of said antibodies being indicative of possible presence of said pathological condition.

89. The method of claim 88, wherein said pathological condition is cancer.

90. The method of claim 89, wherein said cancer is melanoma.

91. The method of claim 90, further comprising contacting said sample to purified cancer associated antigen encoded by SEQ ID NO: 4, 5, 6, 7 or 8.

92. A method for screening for possible presence of a pathological condition in a subject, comprising assaying a sample taken from said subject for expression of a nucleic acid molecule, the nucleotide sequence of which comprises SEQ ID NO: 5, 6, 7 or 8, expression of said nucleic acid molecule being indicative of possible presence of said pathological condition.

93. The method of claim 92, wherein said pathological condition is cancer.

94. The method of claim 92, comprising determining expression via polymerase chain reaction.

95. The method of claim 92, comprising determining expression by contacting said sample with at least one of SEQ ID NO: 11, 12, 13 or 14.

96. A method for determining regression, progression of onset of a cancerous condition comprising monitoring a sample from a patient with said cancerous condition for a parameter selected from the group consisting of (i) a cancer associated antigen encoded by SEQ ID NO: 3, 4, 5 or 6, (ii) a peptide derived from said cancer associated antigen, (iii) cytolytic T cells specific for said peptide and an MHC molecule with which it non-covalently complexes, and (iv) antibodies specific for said cancer associated antigen, wherein amount of said parameter is indicative of progression or regression or onset of said cancerous condition.

97. The method of claim 96, wherein said sample is a body fluid or exudate.

98. The method of claim 96, wherein said sample is a tissue.

99. The method of claim 96, comprising contacting said sample with an antibody which specifically binds with said protein or peptide.

100. The method of claim 99, wherein said antibody is labelled with a radioactive label or an enzyme.

101. The method of claim 99, wherein said antibody is a monoclonal antibody.

102. The method of claim 96, comprising amplifying RNA which codes for said protein.

103. The method of claim 102, wherein said amplifying comprises carrying out polymerase chain reaction.

104. The method of claim 96, comprising contacting said sample with a nucleic acid molecule which specifically hybridizes to a nucleic acid molecule which codes for or expresses said protein.

105. The method of claim 96, comprising assaying said sample for shed cancer associated antigen.

106. The method of claim 96, comprising assaying said sample for antibodies specific for said cancer associated antigen, by contacting said sample with said cancer associated antigen.

107. Method for screening for a cancerous condition comprising assaying a sample taken from a subject for an immunoreactive cell specific for a peptide derived from a cancer associated antigen encoded by SEQ ID NO: 4, 5, 6, 7 or 8 complexed to an MHC molecule, presence of said immunoreactive cell being indicative of said cancerous condition.

108. An isolated nucleic acid molecule consisting of a nucleotide sequence defined by SEQ ID NO: 9, 10, 11, 12, 13 or 14.

109. Kit useful in determining expression of a cancer associated antigen, comprising a separate portion of each of (i) the nucleotide sequences defined by SEQ ID NOS: 9 and 10, (ii) the nucleotide sequences defined by SEQ ID NOS: 11 and 12, and (iii) the nucleotide sequences defined by SEQ ID NOS: 13 and 14.

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C1
Red
D1